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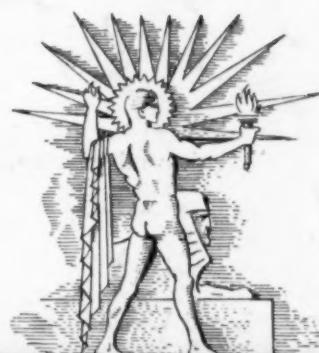
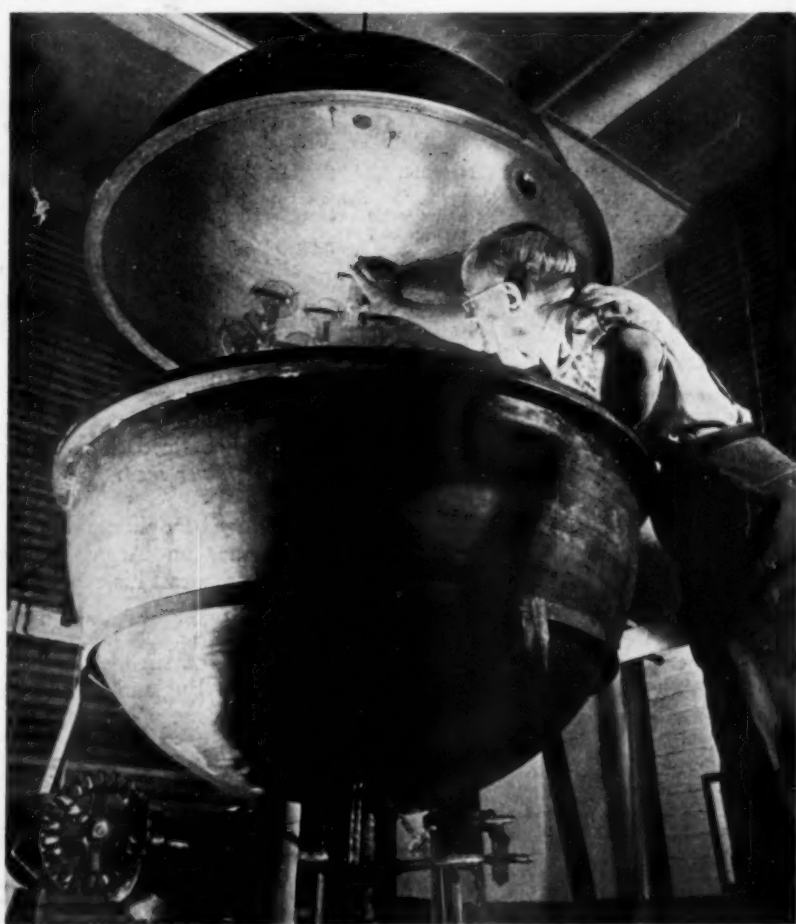
SCIENCE NEWS LETTER

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OCT 7 - 1941

DETROIT

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



October 4, 1941

Glare Elimination

See Page 216

A SCIENCE SERVICE PUBLICATION

Do You Know?

British postage stamps of lower values are to be printed in paler colors—to save dyes.

Useful in assembling airplanes are "firecracker" rivets, which explode into place at the touch of an electric gun.

When the weather changes suddenly, New York's telephone weather report service sometimes gets 4,200 calls in half an hour.

To give Army gunners practice in anti-tank warfare, electrically operated targets move tank-fashion, at a new Fort Dix target range.

A report from Moscow says that more than 10,000,000 Russians in factories, offices, colleges and farms have been trained to work in gas masks.

The U. S. Coast and Geodetic Survey has surveyed 200,000 square miles of the Gulf of Alaska, charting under-sea mountains as high as 12,000 feet on the sea floor.

Movie actresses are at their best, so far as performance and income go, between ages of 25 and 29, and movie actors between 30 and 34, a psychologist reports.

Connecticut has given its hybrid corn an historic naming system, earliest ripening varieties getting such names as Standish, Plymouth and Jamestown, and so on, following American history with later ripening varieties until the very late corn is named Churchill, Roosevelt, Hull, and Wavell.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.

ENGINEERING—PSYCHOLOGY

How can colors be used to prevent accidents? p. 212.

GEOLOGY

How recently was the English Channel formed? p. 216.

MEDICINE

How could deaths of bronchial cancer patients be prevented? p. 222.

How does cancer affect the ability of the body to use vitamins? p. 218.

What drugs may substitute for quinine in the treatment of malaria? p. 212.

What new disease is detected by X-ray? p. 218.

What serious human disease is carried by wild and barnyard fowl? p. 211.

MILITARY SCIENCE

What are Soviet school children taught about living in war? p. 216.

PHYSICS

By what number can you multiply repeatedly to take you from electron to universe? p. 221.

How are cosmic rays created? p. 214.

What is air made of? p. 219.

What record was made of the magnetic storm that accompanied the brilliant aurora? p. 216.

PHYSIOLOGY

How does alcohol affect your ability to respond to pain? p. 217.

Which is more digestible, raw or hard boiled egg white? p. 217.

PHYSIOLOGY—GENERAL SCIENCE

How does dropping through space affect human senses? p. 213.

What chemical "scent" holds a Paramecium to others? p. 214.

What chemical signal betrays presence of tuberculosis germs in the body? p. 213.

Where has a distinct variety of the human species been found? p. 213.

PLANT PHYSIOLOGY

How do tip buds stop the growth of others? p. 217.

PSYCHOLOGY

How can persons be taught to control their own skin resistance? p. 215.

How does the order of lessons affect efficiency in learning? p. 212.

What is the difference between what your right and left ears hear? p. 216.

Why should men make better night drivers than women? p. 214.

What special importance has the new-found ability of monkeys to sort by color? p. 216.

PUBLIC HEALTH

Where is infantile paralysis still on the increase? p. 212.

RADIO

How can static be used to predict the path of hurricanes? p. 211.

WILDLIFE

What rare bird is now on the increase? p. 217.

Citrus wood may be a usable source of lignin for making plastics and other products, two California scientists report.

Glasgow school children are reported to be about a year behind in reading achievement, the result of war conditions.

A recent Japanese order raises the amount of alcohol to be mixed with gasoline for automobiles from 15% to 20%.

Indians obtained flour and edible oil from sunflower seed.

Wearing headphones and holding a microphone, an Argentine parachutist recently broadcast his experiences during descent.

Some German parachute agents dropped in England have been accompanied by homing pigeons for message-sending.

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MEDICINE

Chickens Are Incriminated As Source of Encephalitis

This Summer's Epidemic, Largest on Record and Affecting Three Thousand Persons, Traced to Fowl

CHICKENS are the probable source of encephalitis, or "sleeping sickness" attacks of man and horses.

Evidence strongly incriminating domestic barnyard and wild prairie fowl appears in two reports, one from the U. S. Public Health Service (*Public Health Reports*, Sept. 26) and the other from scientists of the University of California and State College of Washington. (*Science*, Sept. 26.)

The virus or germ of the disease was found in the brain and spleen of a prairie chicken shot on Aug. 27, 1941, near Rugby, N. D., then the center of an encephalitis epidemic, Herald R. Cox, William L. Jellison and Lyndahl E. Hughes, of the Public Health Service's Rocky Mountain Laboratory at Hamilton, Mont., announce. This marks the first time the encephalitis virus itself has been found in an animal other than horses and man.

A much more widespread reservoir than previously suspected for both the horse encephalitis virus and the virus that caused a severe epidemic of encephalitis in St. Louis some years ago is indicated by the findings of William McD. Hammon, John A. Gray, Jr., Francis C. Evans and Ernest M. Izumi, of the University of California, and Howard W. Lundy, of State College of Washington.

They found evidence of encephalitis infection, though not the virus itself, in a significant proportion of domestic fowl from areas where encephalitis cases occurred in 1939, 1940 and 1941.

"It would appear," they state, "that barnyards and fowl runs, found in large numbers in small towns, rural and suburban areas, are the principal foci (centers) of infection for encephalitis of either Western equine or the St. Louis type."

Encephalitis, epidemic in the Northwest this summer, attacked more than three thousand persons, killing at least 190 and probably many more. It was "the largest encephalitis epidemic of record," according to a statement from Dr. James P. Leake, medical director of the U. S. Public Health Service.

The approximately four-to-one ratio of attacks of men and boys of working age over females of the same age, plus the heavy mosquito infestation in North Dakota this summer, Dr. Leake pointed out, indicates strongly that mosquitoes spread the disease from the prairie chickens to the men and boys working in the wheat fields.

Science News Letter, October 4, 1941

RADIO

Radio Static Is Used To Locate Hurricanes

STATIC is just a disagreeable noise to most of us. But, in the hands of Dr. G. W. Kenrick of the University of Puerto Rico, it has become a useful servant for locating and predicting the course of a hurricane.

A method of triangulation similar to that of the land surveyor is used. Stations in Puerto Rico and in Florida pick up the static of the storm, and determine the direction from which it comes. Two lines drawn on a map in the proper directions from the stations determine, by their point of intersection, the position of the source of the static.

Several stations in Puerto Rico are experimenting with this method.

By making continuous photographic records of the flashes of the static receiving tubes at the several stations, the course of a storm can be followed. The camera films are driven by synchronous motors, like those that actuate electric clocks, and the time of receiving a flash is recorded at each station to one-tenth of a second. In this way, Dr. Kenrick explained, it has been possible in several cases to follow the course of a hurricane for more than a thousand miles.

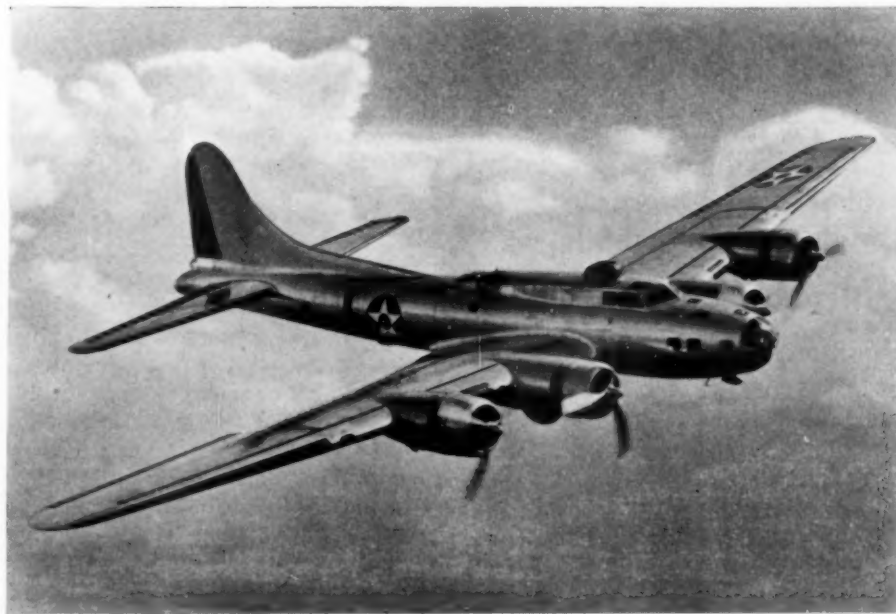
The method is still in the experimental stage, but may become eventually a valuable aid to our Uncle Sam.

Science News Letter, October 4, 1941

PUBLIC HEALTH

Infantile Paralysis Rate Unchanged Over Nation

THE infantile paralysis picture remained practically unchanged throughout the nation during the week ending Sept. 20, with 596 cases reported



"MASS PRODUCTION" FLYING FORTRESS

This is the new four-engine Boeing B-17E, described by the War Department as "bigger and more deadly" than any of its predecessors in the famous Boeing Flying Fortress series. It will be built in quantity by Douglas Aircraft Company and Vega Aircraft Company as well as by Boeing.

to the U. S. Public Health Service, as compared with 595 during the previous week.

Except for Alabama and Maryland, which reported increases, the number of cases in the southern states decreased, as did the number reported from New England. Reports from the East North Central states were about the same as for the previous week. Increases were reported from New York and Pennsylvania.

MEDICINE

Sulfa Drugs May Substitute For Quinine for Malaria

Studies Made in Panama by Rockefeller Foundation And Gorgas Hospital Indicate We May Be Free of Imports

THE SULFA drugs may free the Americas from dependence on non-American sources of that strategic medicinal chemical, quinine, for the treatment of malaria.

This is one important, though unstated conclusion to be drawn from a report by Dr. L. T. Coggeshall and Dr. John Maier, of New York, and Major C. A. Best, U. S. Army Medical Corps. (*Journal, American Medical Association*, Sept. 27.)

Promin and sulfadiazine, two of the newest sulfa drugs, may be regarded as "important substitutes" for quinine or atabrine in treatment of malaria, these scientists state as a result of studies made jointly by the Rockefeller Foundation International Health Division and the Gorgas Hospital, Canal Zone, Panama.

These two remedies were used to treat 30 malaria patients, both native and foreign residents of Panama. Promin was definitely effective in 17 cases, and sulfadiazine was effective in 10 out of 13 cases.

"It should be emphasized," the three doctors state, "that at present there are no reasons for giving the drugs in preference to quinine or atabrine for the treatment of malaria, and they should be regarded only as important substitutes."

The drugs may become vitally important substitutes, it appears, though the scientists do not mention this, in the event that the world's supply of quinine from the Dutch East Indies is cut off by war and present domestic stockpiles are exhausted.

Further study of the drugs as malaria

Both North Dakota and Minnesota reported increases in encephalitis. North Dakota had 37 cases and Minnesota 17.

Influenza cases in Texas, which have been running high ever since last winter's outbreak and keeping the national total above the five-year median figure, dived from 530 to 254. This was still, as the Texas cases have been for the past several weeks, about 40% of the Nation's total of 672 cases.

Science News Letter, October 4, 1941

remedies is suggested. Better anti-malarial drugs than either quinine or atabrine are needed, scientists have long known. Although of great importance to the person with an acute attack of malaria, neither of these drugs can be relied on to remove the germs completely from the patient's blood. Neither have they true preventive action, although when taken in advance of the bite of an infected mosquito, they temporarily suppress an attack of malaria. It may be that some as yet untried or undiscovered sulfa drug will prove a better anti-malarial than any chemicals now available.

Science News Letter, October 4, 1941

PSYCHOLOGY

Proper Order of Lessons Would Speed Training

THE EASE with which you learn a new subject such as physics or mathematics may depend a great deal on the order in which your lessons come, research by Dr. George Katona, fellow of the John Simon Guggenheim Foundation, has revealed. Application of this finding might step up the efficiency and permanence of the learning of students training for defense, he indicated.

If you were studying dancing and Chinese history, it would not matter a bit which lesson you had in the morning and which in the afternoon, he said.

But if one of your lessons makes you understand the general idea of a subject or a principle and the other gives you facts that you can fit into that gen-

eral framework, the general lesson should come first. If you learn them in the wrong order, your score on an examination testing your knowledge of both will actually be lower than the average of two other persons who had each had only one of the lessons.

In one of the experiments described by Dr. Katona, lesson A consisted of an explanation of simple geometrical rules concerning angles. Lesson B required the students to learn by heart the data given for certain building lots—their form and size of their angles.

The unfortunate students who had lesson B first had to memorize all the angles in a mechanical way, almost as if they were learning nonsense. Later learning of the geometrical rules did not seem to clear up what they had already memorized.

Students who learned the general rules first were able soon to cut down on their work because they realized they needed to memorize only some of the angles—the others could be figured at any time from the rules.

Science News Letter, October 4, 1941

ENGINEERING—PSYCHOLOGY

Light Colors Painted on Machinery Improve Seeing

BRIGHTER colors than the conventional dark green or battleship gray of machine tools increase the accuracy of seeing, provide more comfortable working conditions, and also increase production and reduce accident hazards.

These were the findings of a two-year investigation reported before the Illuminating Engineering Society by Arthur A. Brainerd of the Philadelphia Electric Company, and Matt Denning of the du Pont Company.

Color contrast was also found helpful. Of all the solid colors tried, light buff and light gray gave the best results, with aluminum color standing high and light blue next in line. But the best result of all was given by a two-tone scheme in which all machines were painted "Horizon Gray" and the working area "spot-lighted" with light buff.

The psychological effect on the workers was determined by a questionnaire. Photometric measurements were made of the brightness of the surfaces and rates of production were recorded. The work is still going on, the experimenters said, in several industrial plants and further data will soon be available.

Science News Letter, October 4, 1941

PHYSIOLOGY—GENERAL SCIENCE

Dropping Two or Three Miles Makes Jumper Think Better

New Type Parachute Prevents Jumper in Free Fall From Going Into Dangerous Spinning Tumble

DROPPING without a parachute through two or three miles of thin air will not cause a man to lose consciousness unless he is scared. On the contrary, the experienced jumper thinks faster and more clearly. His sight seems to be improved but his hearing is poorer. He breathes more rapidly but his heart action is little affected.

These, in summary, are the physiological effects of long drops, as reported by Prof. Andrew C. Ivy of Northwestern University, before a Symposium arranged by the American Association for the Advancement of Science in connection with the semi-centennial celebration of the University of Chicago.

The data were gathered during five high-altitude delayed-opening jumps by A. H. Starnes, veteran of the parachute-jumping game. Mr. Starnes was described by Prof. A. J. Carlson, of the University of Chicago, one of the group of scientists conducting the research, as "one of the coolest-headed, most courageous men I have ever met." He keeps his wits about him even when tumbling and spinning through space in the most hazardous positions. He has made some 300 jumps from all altitudes up to 10,000 feet.

Delayed-opening parachute jumps are the safest kind to make from modern high-speed planes, Prof. Ivy pointed out. Air resistance slows down the rate of drop to approximately 120 miles an hour, at which it is safe to let the parachute open. At the 300- to 400-mile speeds of present-day war planes, immediate opening of the chute is likely either to injure the jumper or start a fatal tear. Also, an aviator dangling beneath an opened chute is an easy target for the enemy, but he is safe while falling free.

Greatest danger in free falls is from the body going into a flat spin or beginning to tumble. This is confusing, and in some positions may tangle the parachute shrouds. To obviate this, experiments with an auxiliary anti-spin parachute have been tried, with hopeful results.

In his jumps, Mr. Starnes carries a

motion picture camera to record type and rate of spin, a barograph to record atmospheric pressure changes, a broadcasting transmitter, an altimeter, an automatic stop watch, and special oxygen mask and helmet. With his aviator's suit, all this apparatus increases his own body weight of 190 pounds to a jumping weight of about 300 pounds.

Science News Letter, October 4, 1941

Distinct Variety of Humans

A NEW physiological variety of man has been produced in the people of the Andean uplands by life at two or three miles above sea level where the breath contains only a little more than half ration of oxygen.

The report by Prof. Carlos Monge, of the University of San Marcos, Lima, Peru, stimulated speculation that a new race of high altitude flyers might be developed in a similar way.

Lowlanders going into high country become acclimated after an initial period of "mountain sickness"; but the permanent dwellers at great altitudes are not merely acclimated, they are adapted, and have measureable differences in both physique and chemical constitution from the lowland peoples, the eminent Peruvian scientist stated.

There are certain similarities between a height-acclimated lowlander and the permanent altitude dweller. In both, the blood is actually "thicker" than it is at sea level: the fluid is more viscous and the corpuscles are both larger and more numerous. There are also notable chemical changes in the blood, especially in relation to oxygen and carbon dioxide exchange.

However, the highlander's heart is larger in proportion to his body, his lungs have larger air capacity and their capillaries bring the blood more efficiently into contact with the air. Pulse rate is definitely slower, and even severe exertion fails to speed it up very much.

This adaptation to living at great elevations has its reflection in the sociological behavior of the people, Dr. Monge

pointed out. Every year, large numbers of Andean men, driven by necessity, migrate to the coastlands to work in the fields. But they never stay. They have as hard a time becoming acclimated to the "thick" air of the lowlands as a lowlander has becoming used to the "thin" air of the high plateaus.

Hygienic regulations of the ancient Incas, as well as of the early Spanish governors, took cognizance of the inability of plateau people to live successfully at low altitudes. In recent generations, however, the various South American governments have tended to ignore it, with fatal consequences. During the war between Bolivia and Paraguay a few years ago, more Bolivians died of lowland climate in the Gran Chaco than of enemy bullets.

Science News Letter, October 4, 1941

TB Germs Change Blood

WHEN tuberculosis germs are present in the body, the blood makes chemical signals. First readings of these were presented by Prof. Florence B. Seibert of the Henry Phipps Institute, Philadelphia.

A recently developed, highly accurate method of electrical separation has shown that there are four proteins in blood serum. One of these is an albumin; the other three are globulins, designated respectively as alpha, beta and gamma globulins.

In rabbits inoculated with tuberculosis bacteria, Prof. Seibert found that the albumin always decreased. It was always lower than the lowest figure for a normal animal.

The globulins, on the other hand, showed increases. The alpha form usually showed first and most pronounced increases, but the gamma globulin also frequently became higher in animals in which the disease had not yet become very serious. But when beta globulin increased, death usually followed.

Possibility of making diagnostic use of these chemical signals that spell "TB" immediately suggests itself, but Prof. Seibert conservatively declined to commit herself on this point.

Science News Letter, October 4, 1941

Viruses Stay, "Enslaved"

VIRUSES of diseases like smallpox and yellow fever, that are followed by years-long or lifelong immunity to further attacks, are not cast out of the bodies of recovered patients. They remain with them as long as the immunity

lasts. However, they are no longer monsters to be dreaded, but like conquered genii in ancient Oriental tales, they become the servants of those who have bested them, steadily stimulating the production of substances that protect against new invasions.

This theory of immunity following virus diseases was presented to the meeting by Dr. Thomas M. Rivers, director of the hospital of the Rockefeller Institute, New York City.

Other diseases caused by viruses leave the recovered patient immune for only a relatively short time. This is the case, for example, with influenza and the common cold. Following these maladies the body does rid itself of the virus. As a consequence, it has no continuing stimulus to produce immune substances, and when a new infection attacks there is no effective defense ready to repel the invader.

Science News Letter, October 4, 1941

Held Together by Chemical

WHAT KIND of perfume does Paramecium use?

Paramecium is a microscopic one-celled animal that swims in stagnant waters. Its aggregations, forming the most elementary kind of social groupings, are held together by chemical attraction, more irresistibly than a "swell" is drawn to his belle by the exotic scent that breathes from her dainty person.

The chemical basis of this simple society was described by Dr. H. S. Jennings of the University of California at Los Angeles.

The water around an individual Paramecium becomes faintly acid, Dr. Jennings said. Another Paramecium, chancing into this acidified zone, becomes unable to leave it. Every time it approaches the boundary, it is impelled to turn back. Others swim into the charmed circle, and are held as if by the fumes from an ancient magician's potent philtre.

Dr. Jennings found that he could reproduce this chemical social attraction simply by introducing a bubble of carbon dioxide into the water. It set up a charmed chemical boundary just like that of the Paramecium's natural secretion, which the little animals could enter but which they could not leave. Since carbon dioxide is a product of respiration by Paramecium as well as by Man, it is just possible that the only chemical foundation for the charmed social circle in the world of the waterdrop is nothing more than an attractive "breath".

Science News Letter, October 4, 1941

PHYSICS

Cosmic Rays Created by Self-Annihilation of Atoms

Discovery of Identifying Bands for Five Elements Critical for Hypothesis Proposed by Prof. Millikan

COSMIC RAYS are created by the suicide of atoms in the loneliness of interstellar space, in the same manner that light is created by the partial self-destruction of atoms in the densely packed interiors of the stars. Prof. Robert Andrews Millikan, Nobelist of the California Institute of Technology, proposed this hypothesis at the symposia arranged by the American Association for the Advancement of Science in connection with the fiftieth anniversary celebration of the University of Chicago.

The hypothesis, said Prof. Millikan, rests on discoveries made in five recent research projects by his fellow-workers in the Norman Bridge Laboratory of Physics. In sum, these researches indicate that atoms of five elements are far more abundant in interstellar space than those of any other element, and that such atoms are capable of transmutations, giving rise to high-speed particles like those that constitute cosmic rays.

The broad surface of the earth itself is the spectroscopic screen on which should be spread the distinctive bands of cosmic rays, each characteristic of the element from which it originated. If they actually are found distributed in accordance with Prof. Millikan's prediction, this will constitute substantial evidence in favor of its validity. They are predicted as being thus distributed because the magnetic field of the earth should bend each band aside in proportion to the energy or speed of the incoming rays.

The five elements for which the five identifying bands are sought are: helium, carbon, nitrogen, oxygen and silicon. At least partial evidence has already been discovered that some of the bands exist, Prof. Millikan stated. The discovery or non-discovery of the remaining ones will be critical for his hypothesis.

Science News Letter, October 4, 1941

Cosmic Rays Are Protons

COSMIC RAYS are protons, "hard," high-speed atomic particles, when they arrive at the outer boundary of the earth's atmosphere, it is indicated by experiments reported by three Univer-

sity of Chicago physicists, Dr. William P. Jesse, Dr. Marcel Schein and Dr. Ernest O. Wollan. On striking the atmospheric atoms, they give rise to the "middle-weight" particles known as mesotrons. Evidence supporting this conclusion was obtained by sending recording instruments aloft attached to free balloons that reached heights as great as 14 miles.

Science News Letter, October 4, 1941

Earth Mostly 9 Elements

NINETY-NINE per cent of the weight of the earth is made up of only nine of the 88 known elements, Prof. Henry Norris Russell, Princeton University astronomer, told the meeting. All the rest have only one per cent to divide among them.

The same group of elements also make up the bulk of the other objects in the visible universe: stars, nebulae, comets, and the meteorites that bring to us the only samples of the cosmos that we can actually get our hands on. Proportions are different, however: hydrogen, for example, makes up only one-half of one per cent of the accessible earth-parts, whereas it constitutes the bulk of some of the stars.

Science News Letter, October 4, 1941

PSYCHOLOGY

Women More Susceptible To Glare At Night

THE HIGHLY debated question of whether men or women are the better automobile drivers has been studied from a scientific viewpoint by researchers at the University of California. Tests devised by Dr. C. W. Brown, associate professor of psychology, show that men are probably better drivers, at least at night.

Glare blindness resulting from facing oncoming headlights is doubtless responsible for many of the after-dark highway accidents.

"During the normal hours of darkness, from 6 p.m. to 6 a.m., deaths from

automobile accidents increased 18% from 1930 to 1939," the psychologist pointed out. "For the same period deaths during the daytime decreased 20%. In 1939, and for several years immediately preceding, about 60% of deaths resulting from motor vehicle accidents occurred at night."

A simple apparatus developed by Dr. Brown and now used by the State Department of Motor Vehicles, tests the extent of glare blindness in individuals and shows how quickly they recover normal night vision after lights pass.

Tests of 150 University students, conducted by Dr. Brown and his assistants, H. P. Torkelson and L. B. Fisk, psychology students, showed that the average recovery time after glare blindness was 25.2 seconds, with a speed record of 5 seconds by one student and a prolonged blindness of 70 seconds by another. Men average a normal vision recovery time 10 seconds less than women.

This record does not necessarily mean a normally slower reaction in girls but may have been the result of a lower vitamin A consumption in the women's diet, since lack of vitamin A is known to be responsible for night blindness.

Students taking the test who reported difficulty in night driving were found to be slow in glare blindness recovery.

Science News Letter, October 4, 1941

PSYCHOLOGY

Students Taught to Control Skin's Electric Resistance

YOU can be taught to control such an apparently unconscious and involuntary thing as the electric resistance of your skin, Dr. R. H. Henneman, psychologist of the College of William and Mary, has found.

Emotion may change your skin resistance just as it does the rate of your heart beat or the dilation of your eye pupils. But this change is ordinarily beyond your control and would betray you if you submitted to the so-called lie detector.

Dr. Henneman has "conditioned" eight persons so that they can voluntarily change their own skin resistance by silently saying the signal "humdum" to themselves, he told the American Psychological Association. After first thinking of this word at the same time they received the real emotion stirring signal of an electric shock, they could later produce the skin resistance change merely by giving themselves the silent word signal.

Science News Letter, October 4, 1941

New Machines And Gadgets

Novel Things for Better Living

Oriental hog bristles, used for the finer brushes, having become scarce, nylon bristles have been substituted for many uses. A recent example is a rotary brush for pasting wrappers on packages. They are said to last nearly twice as long as natural bristles. They do not fray or split, retain their stiffness in hot water, and dry very quickly. Another advantage is that they can be accurately made of a specified diameter, and all of the same diameter throughout, an important point to which the Oriental hog pays no attention.

A combined tie clip and nail file is the subject of three patented designs. The nail file composes the part that enters the enclosing clasp. In one design the combination when closed is made to look like a miniature golf bag with the tip of a golf club sticking out. In another the combination is made to look like a miniature gun in its case with the butt of the gun protruding. The third is a tiny swordfish, the tail of which forms the handle of the nail file.

Your trigger finger will always be available for use even though you wear thick gloves if you make use of a glove with a slit along the forefinger. A mitten with this convenient provision was invented by the Duchess of Windsor, who realized that a man in battle would find it extremely awkward and also chilly to have to remove the entire mitten whenever he had to use his forefinger. Of course, he might not always need it for pulling a trigger. There are other uses of a forefinger. An improvement on this device has recently been granted a patent. It consists of a tiny slide fastener, with which the opening may be closed, and the forefinger may lie snug and warm until its services are again required.

Dry ice is used in a novel method of testing sealed containers for leakage. Pellets of the dry ice are put into the containers which are then sealed and immersed in water. Dry ice is frozen carbon dioxide, the gas that causes the soda pop to fizz. In the warm surroundings the dry ice evaporates into the original gas, and any leakage will be disclosed by bubbles rising in the water.

This oxy-acetylene torch is cutting a 45-degree bevel on a ½-inch steel plate at the rate of 16 inches per minute. Cutting a bevel is more difficult than vertical cutting. More heat is required because some of the heat bounces off and does not penetrate to the same extent as when the flames strike the



plate at right angles. The torch must be moved very uniformly, for otherwise ridges will be formed. Too much heat and too little heat produce other defects.

Tonsils are made plainly visible by the use of a new tongue depressor by which light is "piped cold" from an outside source to the throat while the patient says "Ah." This conveyance of the light is made possible by the wonderfully clear methacrylate resin. The depressor is simply a strip of the plastic 3½ inches long, ¼ inch wide, and ¼ inch thick. It serves both to depress the tongue and to convey the light. The latter is supplied by a cylindrical flashlight battery which serves also as a handle. The light is conveyed from the bulb to the mouth through the substance of the plastic by means of internal reflection. Very little leaks out the sides, so that nearly all comes out at the farther end. This method of piping light, much used by physicians and surgeons, is now being applied in industry to examine inaccessible parts of machinery.

If you want more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N St. N. W., Washington, D. C., and ask for Gadget Bulletin 73.

Science News Letter, October 4, 1941

● RADIO

Thursday, October 9, 3:45 p.m., EST

On "Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Dr. C. I. Post, of the Vitamin Division of the National Oil Products Company, will discuss the aid given by vitamins in national defense.

Listen in each Thursday.

Monday, October 13, 9:30 p.m., EST

Science Clubs of America program over WRUL, Boston, on 6.04 and 11.73 megacycles.

One in a series of regular periods over this short wave station to serve science clubs, particularly in high schools, throughout the Americas. Have your science group listen in at this time.

GEOLOGY

English Channel Is Recent Act of Nature

THE English Channel, which has thus far kept German invaders out of Britain, is so recent a body of water geologically that it may have been formed only 5,000 years ago, says Prof. Edward Steidle, dean of Pennsylvania State College's school of mineral industries.

"Even now, an elevation of only 120 feet would unite England and the continent again," he explains.

The channel which provides England with a valuable moat for defense was formed near the end of the last great ice age in Europe. Melting ice and retreat of the ice sheet caused sea level to rise, forming the North Sea, Baltic Sea, and the channel which cut England from France.

Science News Letter, October 4, 1941

MILITARY SCIENCE

Soviet Children Taught War Living At School

SCHOOL CHILDREN in Soviet Russia this autumn are being taught in classrooms a grim and practical science of how to stay alive in war.

German invasion made it necessary for educators in Soviet Republics to do quick conferring and plan a new program, putting vital education first, according to a report received by Soviet representatives in this country.

Since children may be lost from families or teachers in sudden attack or evacuation, Soviet pupils are all being taught to read maps and use compasses. Every pupil is required also to learn to draw plans and take measurements—important if Soviet troops need directions about Nazi troops in a village, or other local geographic information.

Basic courses in Russian schools this term teach children war's applied chemistry of how to fight poison gas, how to extinguish incendiary bombs and what they should know about war explosives.

Older pupils are getting simple lessons in using telegraphic and optical instruments for communication emergencies. They are taught elementary facts about ballistics and diesel motors, and lessons about terrain, in case they are needed to fill some vital task quickly.

For morale building, Soviet educators are having teachers stress exploits of old Russian heroes and Soviet achievements in science, literature and art.

Physical training and military instruction for boys has been broadened to in-

clude swimming rivers, throwing hand grenades, and using fire-arms and bayonets.

The U.S.S.R. had expected 36,000,000 children to enroll in elementary and secondary schools, but the German advances have admittedly disrupted schooling in some areas.

Science News Letter, October 4, 1941

ENGINEERING

Glass Without Glare Prepared Electrically

See Front Cover

GLASS without glare is prepared by coating the surface with a film of magnesium fluoride 1/300,000th part of an inch thick. The process must be carried out in a vacuum where a tiny bit of the fluoride is electrically evaporated. Hence the great globe shown on the front cover of this week's SCIENCE NEWS LETTER, a form adapted to resist the enormous atmosphere on the outside!

In the photograph C. W. Moore is putting the glass surfaces to be treated into the sphere where alnico magnets hold the metal frames in which the glass has been placed.

The process was developed by Dr. C. W. Hewlett of the General Electric Company's research laboratory.

Science News Letter, October 4, 1941

PSYCHOLOGY

Right Ear Doesn't Hear What the Left Ear Does

YOUR right ear doesn't hear what your left ear does, Dr. S. S. Stevens and J. P. Egan of Harvard University have found.

Although it is only in defective ears that this "double hearing" is dramatic, persons with "normal" hearing perceive the pitch of the same tone as higher in one ear than in the other.

This was discovered when seven people listened individually in an apparatus which delivered separate tones to their two ears. The individual could listen first with one ear and then with the other and adjust the pitch of one tone until they matched.

The amount one tone had to be altered in pitch so that it would sound the same as that heard by the other ear was sometimes as much as two and a half per cent.

The difference in perception of the two ears was generally greater at low intensities than for loud sounds.

Science News Letter, October 4, 1941

IN SCIENCE

PHYSICS

Coast and Geodetic Survey Recorded Magnetic Storm

RECENTLY installed instruments of the U. S. Coast and Geodetic Survey geomagnetic laboratory at Cheltenham, Md., were able to make a complete record of the great magnetic storm that interrupted wire and radio communication before and during the magnificent auroral display of Sept. 18. They were able to do this, Capt. N. H. Heck of the Survey explained, because they are insensitive, so that their indicators did not swing completely off the scale, as would have been the case with older, more sensitive instruments.

Ranges in magnetic intensity of 2540 gammas (geomagnetic units) in the horizontal direction, and of 1390 gammas vertically, were recorded. The ordinary magnetic storm records a range of only 300 or 400 gammas.

Science News Letter, October 4, 1941

PSYCHOLOGY

Monkeys Trained to Sort by Color When Shade Differs

MONKEYS don't ordinarily go shopping, but they can be taught to match samples by colors, psychologists at the meeting of the American Psychological Association learned from a report by Dr. Benjamin Weinstein, of the University of Wisconsin.

Not only did Dr. Weinstein succeed in teaching his monkeys to pick out from a group of objects the particular one that matched the color of his sample, he was also able to train them to select from an array of objects all the reds or all the blues regardless of how deep or how light the tint was.

This experiment gains importance from the present emergency. During the first World War, it was found that wounded soldiers with brain injuries were often unable to do what these monkeys have learned to do. Dr. Weinstein hopes through study of his animals to discover facts that may be of value in treating the wounded of this war.

Science News Letter, October 4, 1941

CE FIELDS

WILDLIFE

Trumpeter Swans Show Some Increase in Numbers

TRUMPETER SWANS, which for years have just barely escaped joining the passenger pigeon and the heath hen in the ranks of extinct species, are holding their own, and even showing a slight increase, joint studies by biologists of the U. S. National Park Service and the U. S. Fish and Wildlife Service indicate.

This year's count of all specimens that could be located shows a total of 211 birds, as compared with 190 in the 1940 census. The two centers of trumpeter swan population are in Yellowstone National Park and the Red Rock Lakes National Wildlife Refuge in Montana. The latter place is under the jurisdiction of the Fish and Wildlife Service.

The species no longer undertakes long migration flights, but shifts between these two centers. During the current year young birds were observed for the first time on Hegben Lake in Montana, which lies between the two sanctuaries, indicating nesting at that site.

Science News Letter, October 4, 1941

PHYSIOLOGY

Alcohol Reduces Ability Of Body to React

ALCOHOL reduces the ability of the body to respond with an alarm reaction when large areas of the skin are exposed to heat, the National Academy of Sciences learned from a report by Dr. J. D. Hardy, of the Russell Sage Institute of Pathology, Cornell University Medical College, and Drs. H. Goodell and H. G. Wolff, of New York Hospital and Cornell.

Although different people are equally sensitive to pain, these scientists have found a wide variation in the way they respond to hurt.

An easily measured alarm reaction of the body is a change which occurs in the electrical resistance of the skin. The amount of heat shining through a condensing lens onto the forehead necessary to produce a barely perceptible change in skin resistance was measured by these investigators.

Not only is it different in different individuals, but it is different with large areas of the skin than with small, they found. When an area of 30 square centimeters of skin is exposed to the heat, the intensity necessary to change the skin resistance is only eight hundredths of the amount necessary to produce pain. And this required amount is variable—both from person to person and from time to time in the same individual. In a skin area smaller than three square centimeters, however, the threshold of reaction was not so variable and was about the same as the amount necessary to produce pain.

When large areas of the skin are exposed to heat, the body shows an alertness or alarm reaction in response to a strong sensation of heat and warmth. But when the area is small, such a reaction is only to pain, the investigators conclude.

Drugs change this ability of the body to respond to heat. When acetylsalicylic acid was given to the subject, he did not respond until the heat over a large area was sufficient to produce pain. When alcohol was given, even more heat was endured without response.

Science News Letter, October 4, 1941

FORESTRY

Trees Reached New England Via Route Now Submerged

IMMIGRANT OAK and beech trees long ago pushed their way up the Atlantic coast to New England and southeast Canada over a migration route now lost under water, it appears from evidence which a contractor at Brooklyn Navy Yard has turned over to plant scientists.

The evidence, consisting of peat samples taken from 40 and 60 feet below the surface, contains pollen in which oak and beech predominate, says Dr. Paul B. Sears of Oberlin College, who has studied the pollen content.

"This indicates quite clearly that at the time the peat was formed, deciduous forest conditions prevailed on the then exposed but now submerged surface, presumably affording an opportunity for the northward migration of plants appropriate to deciduous forest conditions," he reports. (*Science*, Sept. 26.)

Botanists and others have been interested, Dr. Sears explains, in the presence of southern plants in southeast Canada and New England, possibility of such a migration path has been speculated.

Science News Letter, October 4, 1941

PHYSIOLOGY

Raw Egg Less Digestible Than When Hard Boiled

SWALLOWING raw eggs, with the idea of getting some easily digestible protein, is all a mistake, Dr. Donald D. Van Slyke, of the Rockefeller Institute for Medical Research, told the meeting of the American Association for the Advancement of Science. If you really want to make egg white digestible, he said, boil it hard, then rub it into fine particles through a sieve.

Dr. Van Slyke's address had to do with the physiology of the amino acids, which are the units or building-blocks of which proteins are composed. There are 21 amino acids which the human body must have. Ten it can manufacture itself out of other materials if they are not supplied from outside sources. The other eleven cannot be synthesized within the body; they must come ready made, or we starve.

Special effects of various amino acids have been studied on animals. Some of them have special actions, in neutralizing certain definite poisons.

Science News Letter, October 4, 1941

PLANT PHYSIOLOGY

Tip Buds Poison Others With Growth-Checking Stuff

BUDS on the tips of plant branches literally poison their younger brothers to maintain their position of dominance. They secrete a growth-checking substance which prevents the development of lateral buds, or at most permits them only limited growth, explained Dr. John W. Mitchell of the U. S. Department of Agriculture to the American Association for the Advancement of Science.

It has long been known that plant stems continue their growth because the bud at the end has this dominance over other buds. It has also been known that if the terminal bud is removed, other buds farther down begin to develop, sometimes with a new establishment of dominance by one of the awakened lateral buds. But there has been no agreement among botanists regarding the mechanism underlying this phenomenon.

Lately, however, it has been demonstrated that substances extracted from certain parts of plants inhibited growth when applied to the buds of a normal plant. Synthetic growth-regulating substances have also been prepared which have similar effects.

Science News Letter, October 4, 1941

MEDICINE

Cancer Patients Show Failure In Body Use of Vitamins

White Blood Cells of Leukemia Patients Also Contain More Vitamin B₁ Than Cells of Normal Persons

PATIENTS with cancer and with the fatal, cancer-like blood disorder, leukemia, fail to utilize certain vitamins normally, it appears from studies reported by Dr. Jules C. Abels, of New York City, at the meeting of the American Röntgen Ray Society in Cincinnati.

White blood cells of leukemia patients contained more vitamin B₁, or thiamin, than the largest amount of this vitamin found in white blood cells of normal persons. The reason, Dr. Abels' studies seem to show, is that the conversion of the vitamin into another chemical, pyrimidine, which normally occurs during the physiological activity of the vitamin is abnormal in the white blood cells in leukemia. Injection of thiamin into the blood of normal persons, Dr. Abels reported, is followed by an increased concentration of pyrimidine in the white blood cells, but in the leukemia patients, the pyrimidine content of the white cells decreases after giving thiamin.

The amount of vitamin A in the blood plasma of patients with cancer of the stomach or intestines is below normal in 86% of the cases, Dr. Abels found.

"Dietary deficiency or malabsorption of vitamin could not explain the low plasma levels of the vitamin in more than half the patients," he said. "On the other hand, individuals who have such lesions as atrophic gastritis or oral leukoplakia have much lower vitamin A levels. It is probable that the livers of

these patients no longer have the ability to properly form, store, or distribute the vitamin."

Science News Letter, October 4, 1941

X-rays Detect New Disease

USE of X-rays to help diagnose a recently discovered and sometimes fatal ailment called toxoplasmosis was reported by Dr. L. M. Sante, of St. Louis, and Dr. Cornelius G. Duke, Dr. Abner Wolf and Dr. John Caffey, of New York, to the American Röntgen Ray Society.

Inflammation of the brain and paralysis, with no sign of lung involvement, are the chief features of the disease in babies and small children, Dr. Sante pointed out. In adults, however, the disease may resemble Rocky Mountain spotted fever and symptoms of acute pneumonia are prominent. Dr. Sante described several types of toxoplasmosis cases and the signs of lung involvement which may be found in X-ray pictures.

In infants, the New York doctors explained, the X-ray will show signs of internal hydrocephalus (water on the brain) and calcification of the brain.

Diagnosis may also be made, these doctors pointed out, by blood tests showing the presence of antibodies for the large one-celled parasite, *Toxoplasma*, which causes the disease.

Science News Letter, October 4, 1941

TB Causes Heart Failure

A LARGE number of deaths from heart failure through enlargement of the right side of the heart are caused by pulmonary tuberculosis, Dr. Leo Rigler, of the University of Minnesota, declared.

Röntgenologists who make X-ray examinations of the chests of patients with tuberculosis and also those with long-standing bronchial asthma should, Dr. Rigler urged, be on the look-out for right heart enlargement.

Dr. Rigler and Dr. Phillip Hallock, reviewing autopsy records of 30,265

cases at the University of Minnesota department of pathology, found 5,265 cases in which death resulted from heart failure. Of these, 102 were considered cases of pure right heart failure, he said.

In this group the leading original cause of the heart disease was pulmonary tuberculosis, with 29 cases. Second highest was bronchial asthma, 19 cases; third, bronchiectasis, 15; pulmonary arteriosclerosis, 10; silicosis, 5; and the remaining of varying origin.

Science News Letter, October 4, 1941

GENERAL SCIENCE

Americans Join British In London Conference

AMERICAN scientists, among them Dr. Albert Einstein, President James Bryant Conant of Harvard, Nobelists Ernest O. Lawrence and Harold C. Urey, President Frank B. Jewett of the National Academy of Sciences, have sent messages to the conference on "science and the world order" held by the British Association for the Advancement of Science in London.

The prevailing theme of these pronouncements is that once the war against Nazism is won with the help of science, there must be use of scientific knowledge and method in making a new world worth living in.

Since the London conference, unlike most scientific meetings of the past, has participation by the American Ambassador Winant, it takes on a quasi-official character. It is considered an indication that American official circles are looking seriously at the shape of things after the military struggle is won.

Two social scientists from Washington have flown to London to join in the conference: Prof. Luther H. Gulick of Columbia University, who is consultant of the National Resources Planning Board, and Prof. Alvin H. Hansen of Harvard, who is consultant of the Federal Reserve System.

H. G. Wells was chairman of a session on "Science and the World Mind."

Science News Letter, October 4, 1941

Salt water fish contain much more iodine than fresh water fish.

The Russian port of *Archangel*, which has about 281,000 people, is pronounced the largest city in the world so far north.

"Shelter feet" and "parachutist's heel" are the new foot afflictions of the present war instead of the trench foot of World War I.

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PHYSICS

Air—Breath of Life

10,000,000,000,000,000,000 Molecules in Each Cubic Centimeter—Simple Mixture With Minute Impurities

ABOUT ONCE every five seconds man fills his lungs with a simple mixture of gases—air.

If this unconscious process ceases for very long, the life of any land-dwelling creature is at an end. Existence on this planet is possible only because there is a superabundance everywhere of nitrogen and oxygen in the proper proportions.

"As free as the air" is a common figure of speech. Only water has a comparable significance to living things. The more minutely air is analyzed, the more complex it seems, and today physicists and chemists recognize that they still have far to go before they can present an adequate picture of the "breath of life." There are many things in it whose existence, to say nothing of whose significance, is just beginning to be recognized.

The ancients spoke of four elements—earth, air, fire and water. Quite naturally they considered the all-encompassing atmosphere as a distinct substance which could not be split up into other constituents. By the beginning of the nineteenth century, however, this concept had been generally abandoned and air was recognized as primarily a mixture of the gases oxygen and nitrogen with various impurities.

Research at Carnegie

Further steps now are being taken in laboratories all over the world, and some of the most notable work is carried on at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. A clear understanding of the composition of the atmosphere is essential to explain its electrical conductivity, but the investigations seem to be yielding results significant in far-removed fields, such as the ventilation of buildings and possible explanations of air-borne diseases. Hardly anything could be discovered about air which would not be of potential significance.

In a cubic centimeter of air there are approximately 10,000,000,000,000,000,000 molecules. This shows strikingly how small a molecule really is.

About 500 cubic centimeters are inhaled in a single breath.

Nearly 80 percent of these molecules consist of two atoms of the heavy gas nitrogen. About one-fifth are double atoms of oxygen. There are a few single atoms of the rare gases argon and helium. Roughly half of one percent are particles of the gas carbon dioxide, from which plants, by the process of photosynthesis, extract the carbon which constitutes the major part of their structure—the starches and sugars which are the fuel of animal life.

These gases are not chemically combined. They are simply mixed together, each retaining its identity.

Very Little Impurity

Mingled with them are extremely minute amounts of impurities—particles of water vapor, of dust, of smoke, of gaseous forms of other elements which leak from the earth, of bacteria, of the giant molecules of viruses which are the carriers of deadly diseases, of plant pollen which brings hay fever.

At their worst, the impurities constitute a very small percentage of the whole. The air may seem to be all dust to a person caught in a dust storm. Actually, in comparison with the number of molecules present, the number of particles is small indeed. In the thickest sort of fog, it has been estimated, there are only about 1200 water droplets, each about 10 ten-thousandths of a centimeter in diameter, in a cubic centimeter.

Now each molecule of air might be considered normally as electrically neutral. Yet many of them, tests show, actually carry positive or negative electrical charges. One or more atoms of such a particle has an outer electron too few, or too many. Something has been introduced to disturb the balance—some radiation capable of stripping away electrons. There are only three major possibilities in the lower atmosphere, physicists have determined.

First is the radiation from the radioactive elements in the crust of the earth itself. This contains everywhere minute quantities of radium and thorium, on an average two or three parts in a trillion. These exploding elements con-

stantly are emitting powerful radiations—alpha particles, beta and gamma rays. They hit the gas molecules of the atmosphere, strip electrons from them, and thus create positively charged particles.

This accounts, Carnegie physicists believe, for about three-tenths of the "ions," or electrically unbalanced atmospheric particles. Most of this is due, in turn, to the penetrating gamma, or X, rays from the radium and thorium. The beta rays, single electrons, and the alpha rays, nuclei of helium atoms, hardly can get into the air from more than a fraction of an inch below the surface of the soil. The gamma rays, however, can go into the air from depths of several feet.

By far the most important ion-makers close to the surface are the radio-active gases—radon, thoron, and their progeny—which leak from the soil. These are the decay products of radium and thorium. Quite short-lived, they are being formed constantly by the break-down of these elements in the surface rocks. They escape and form part of the atmosphere itself. Probably in each breath one gets nearly a thousand particles of the exploding gases—never enough, however, to have the slightest physiological effect on a higher animal. Their radiations, it is calculated, are responsible for at least half the ions in the air adjacent to land.

Most Penetrating

The other producer of ions in the lower atmosphere is the cosmic ray, most penetrating of known radiations. These rays, originating somewhere in outer space, constantly are bombarding the earth and creating ionizing showers in the upper atmosphere which, in turn, make charged particles near sea level. This is the preponderant ionizer over the oceans and polar regions.

From all these radiations combined are formed approximately nine ions per cubic centimeter of atmosphere per second. They are all, at the start, negatively charged; that is, a molecule lacks one or more electrons, or negative electrical units. This ordinarily lasts only an instant. The freed electrons are joined either to neutral molecules, giving them negative charges, or to other positive ions, which are rendered neutral again. At any one time there is probably close

to a balance of positive and negative ions in the atmosphere.

These all are known as "small ions," two or three atoms in size. They make the atmosphere an electrical conductor, however poor at the best.

Otherwise, it would seem, they have no effect. Certain Russian and German experimenters have claimed that very large concentrations of negative small ions in the atmosphere are exhilarating while positive ions are depressing. A few years ago there developed in Russia a system of "aerionotherapy," and remarkable cures of about 30 different maladies, from stomach ulcers to tuberculosis, were claimed. The claims have not been fully substantiated by American investigators, and their validity is open to serious question.

In any event, however, they refer to concentrations of small ions enormously greater than would ever be found in the atmosphere—about one to every 10,000,000,000,000 gas molecules. In a year the average human being doubtless absorbs less than a few million-million atmospheric ions, scarcely enough to make up a body as large as a rain drop. This amount could hardly be expected to have any effect whatsoever, *per se*. It might, however, serve as an activator of some chemical process within the body. As to this, there is no evidence, one way or another. Here is at least an interesting field for investigation by physiologists.

Large Ions More Abundant

Far more abundant in the atmosphere, and perhaps of greater biological significance, are the so-called "large ions." One of these may be a thousand times the size of a small ion and in some places they are at least 1,000 times more abundant.

An ionized molecule tends to give up its charge to any foreign particle in the atmosphere—a water droplet, a speck of dust, a grain of pollen. Thus is constituted a relatively enormous charged body. It is likely to build itself up by the addition of other ions and may end as either a charged or neutral particle.

The number of these large ions varies enormously from place to place, and from time to time. Lighting of fires in the autumn causes a very large increase around towns and villages. These particles are generally least numerous in the air over the ocean.

An interesting recent discovery of Dr. G. R. Wait, physicist of the Department of Terrestrial Magnetism of the Carnegie Institution, is that the num-

ber of these particles in the atmosphere of a room is enormously increased by the presence of human beings. It is difficult to explain the phenomenon. One possible deduction is that there are approximately 200,000,000 particles nearly 100 times the diameter of air molecules in every exhaled breath. Where do they come from? One theory is that they are the "smoke" of the fires of life—the constant burning of carbohydrates which maintains the temperature of the body.

Much further investigation is needed for an entirely acceptable explanation. The exhaled particles—many of them either positively or negatively electrified—may play a role, as yet unknown, as carriers of disease-causing microorganisms, such as filterable virus molecules. They probably explain, Dr. Wait believes, why one is able to see one's breath on a frosty morning even in an exceptionally clear, and consequently relatively pure, atmosphere.

When the breath is exhaled its moisture condenses around large particles in the atmosphere. If the air were free of them, it would be expected that the breath would be invisible, but it never is. This can be explained by the finding of particles in the exhalation itself.

This finer structure of the atmosphere is far too elusive to be studied by chemi-

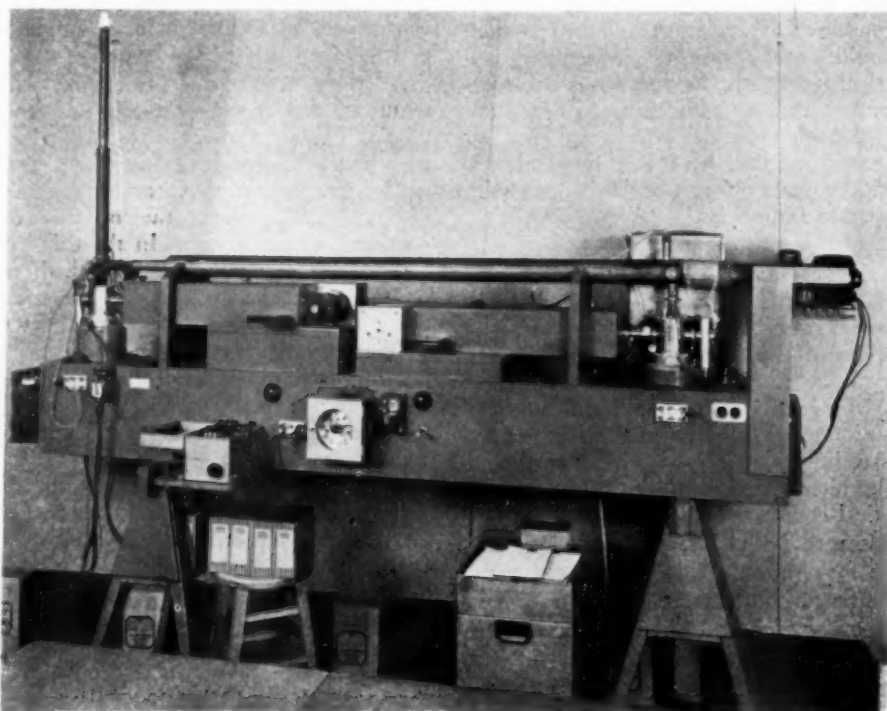
cal methods. There are two ways of counting the ions, however, both of which give approximately the same results. One is an adaptation and a forerunner of the so-called Wilson cloud chamber, by means of which the existence of the atmospheric particles first was demonstrated. Air condenses on particles in much the same way as clouds are formed in the sky. The droplets which fall in a dark field can be counted.

This is a convenient device which can be carried in the pocket. It sometimes is referred to as an "electric nose," since by means of it one can track down a source of large ions, such as smoke from a chimney, decaying vegetable matter in a swamp, or a spray of water. The particles which are counted, however, need not necessarily carry electric charges.

The other method requires the use of a device for counting electrical particles—measuring the concentration of the several types of ions in a locality.

Both methods are being used in the Carnegie Institution studies. At present special efforts are being made to determine the rate of formation of the various types of ions. Accurate information on this is essential to the understanding of various aspects of electrical conduction through atmosphere.

Science News Letter, October 4, 1941



AUTOMATIC

This apparatus counts automatically the electrically charged condensation nuclei in the atmosphere. It is in the laboratories of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington.

METEOROLOGY

Hurricane Season Follows Two Years Without Storm

Three Major Storms Within Week Bring Destruction From Texas Across United States into Canada

THE HURRICANE season got off to a violent start this year with three major storms within a week, two in the Gulf of Mexico and one in the Atlantic. For several days two storms were raging simultaneously.

The season was late in starting—it usually begins in mid-August and lasts until mid-October—but it made up for its tardiness with extra fury. It also marked the end of an unusually quiet period. There has been no hurricane of major importance for the past two years, the Weather Bureau informed Science Service.

The Atlantic storm ran a curious course. It was first reported Sept. 18 about a hundred miles off the east coast of Florida. It was then moving almost due east, which it continued to do for two days, going 600 miles out to sea. There it stopped, drifted about for a day and a half, then looped back and headed straight for Cape Hatteras. This looked bad and aroused fears that Washington might get a whiff of the storm. But the old storm—five days old by then—changed its mind again, swung off to the north and east, passed 250 miles southeast of Nantucket and sailed again out to sea, this time for good.

No serious damage was done by this storm. Only some high tides were produced along the Atlantic coast.

Quite different is the story of the second Gulf storm. At first it seemed the more orderly although the more violent of the two storms. First reported Sept. 20 about 150 miles west of Cuba, it moved steadily northwest for three days toward the coast of Texas just north of the Mexican border. Consequently it was expected to strike at or near this point. Instead, it veered to the north and northeast, struck the coast about 75 miles west of Galveston and passed directly over Houston, Texas' largest city, 55 miles inland. Coming unexpectedly, people were not adequately prepared for it, much damage was done and several lives were lost.

Extremely high tides occurred, due to the fact that the waters heaped up by

the previous hurricane had not yet fully subsided. These tides, rolling up the estuaries of the Texas rivers, flooded much of the coastal country.

After passing Houston, the storm continued its northeasterly course with accelerated speed, passing entirely across the United States in 24 hours and crossing Lake Huron into Canada.

Another storm of hurricane force began raging in the Caribbean between Haiti and the South American coast, heading toward Nicaragua on September 26.

Science News Letter, October 4, 1941

PHYSICS

From Electron to Universe By New Multiplication Table

A NEW picture of the Universe from the smallest things to the greatest is given by a sort of multiplication table suggested by M. Davidson in the *Journal of the British Astronomical Association*. Taking his cue from Sir Arthur Eddington's famous lines in his book "The Expanding Universe,"

"A hundred thousand million stars make one Galaxy;
A hundred thousand million Galaxies make one Universe"

Dr. Davidson proposed a series of things each of which multiplied by 100,000 would give the size of the next in the series.

Beginning with the electron, as the smallest thing known in the Universe, the multiplication table of the Universe would run like this:

A hundred thousand electrons side by side stretch the width of an atom.

A hundred thousand atoms side by side stretch the width of a white blood corpuscle.

A hundred thousand white blood corpuscles side by side reach a length of 13 feet.

A hundred thousand times 13 feet is the radius of the minor planet Vesta.

A hundred thousand times the radius of Vesta will reach from the center of

the sun to one-third of the distance to Mercury—the planet nearest the sun.

A hundred thousand times this distance is one-tenth of a light year or the distance that light, traveling 186,000 miles per second, would reach in the tenth part of a year.

A hundred thousand times a tenth of a light year is of course 10,000 light years, one time supposed to be about the size of our own Galaxy or Milky Way system, but now believed to be more than ten times as large.

A hundred thousand times 10,000 light years is a billion light years, a distance that would stretch across the whole Universe now visible to astronomers.

Here ends the table of M. Davidson, but not the Universe. With each increase in the size of telescopes, with each increase in the sensitiveness of photographic plates, the visible Universe is extended. And the number of stars coming in with each increase indicate that the end is still far away. Every theoretical model of the Universe, beginning with Einstein's, has made the radius of the Universe thousands of times greater than that of the part now visible.

Science News Letter, October 4, 1941

Radioactive phosphorus produced in the atom-smashing cyclotron at the University of California has been shipped to Peru for medical use.

Possible for next spring—straw hats made from woven plastic.

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Not Necessarily a Nuisance

PORCUPINES are not necessarily the unalloyed nuisances in the forests which many foresters consider them, Prof. James D. Curtis, of the University of Maine, suggests. Their bark-chewings are not always harmful, and in many instances may even be beneficial, he points out (*Jour. Forestry*, July).

During the growing season porcupines feed largely on green herbage at ground level, so that except in winter they do neither good nor evil so far as trees are concerned. But in the snowy months they do much of their feeding in the tree-tops, where they chew the bark from smaller branches. Considering how heavy-bodied and apparently clumsy they are, porcupines are astonishingly good climbers. Prof. Curtis states that he has found evidences of their gnawings as much as 70 feet above the ground.

Porcupine feeding injury to trees takes three principal forms. They chew patches of bark off branches and trunks, exposing the wood to the attack of rot-causing fungi. They gnaw smaller branches completely off. Finally, they sometimes gir-

dle the upper part of the trunk completely, in which case of course the whole tree above that point dies.

Prof. Curtis questions whether cutting off branches is necessarily injurious. It may be a form of harmless or even beneficial pruning. Also, it sometimes has the incidental value of dropping leafy boughs of hemlock for deer to browse on, in seasons when such provender is hard to find at ground level.

Furthermore, Prof. Curtis contends, even when trees are seriously injured or even killed as a result of porcupine feeding, the value of the injured tree should be considered. Many of the trees thus eliminated would have to go anyway, in the ordinary process of thinning

to make better stands of timber. Many others are of species held in low esteem from the viewpoint of commercial forestry. And a considerable part of Porky's feeding is done on shrubs which have no economic significance, or (like stag-horn sumac) are "weeds" that hinder the establishment of valuable trees.

Before turning in a final verdict, either against or for porcupines, Prof. Curtis urges, foresters should conduct thorough and unprejudiced researches on what the porcupines in their particular regions actually do to the trees. To shoot all porcupines at sight, just because one sees de-barked branches on some trees, seems a bit unscientific, to say the least.

Science News Letter, October 4, 1941

MEDICINE

Bronchial Cancer Patients Saved by Early Diagnosis

Far Too Many Now Allowed to Die Without Effective Treatment Although Diagnosis Is Possible Early

FAR too many patients with bronchial cancer are now denied the benefit of effective treatment and allowed to die "because no steps are taken even to arrive at a diagnosis until the condition is hopeless."

This charge of laxity or ignorance on the part of both the laity and the medical profession was made by Prof. Evarts Graham, of Washington University, St. Louis, at the University of Chicago Fiftieth Anniversary Celebration. Prof. Graham was among the 35 scientists and scholars to receive honorary degrees at the close of the celebration on Sept. 29.

Bronchial cancer constitutes about 10% of all cancers, Prof. Graham declared. Among patients coming to Barnes Hospital in St. Louis, 88% were in such an advanced stage of the disease that

they could not safely be operated on.

"Yet in 75 or 80% of cases a bronchoscopic examination and biopsy will establish the diagnosis even in early cases," he declared.

The only treatment known to be effective for this condition is complete surgical removal of the cancer, which usually means complete removal of the lung. One patient is now living and well in his ninth year after operation and many more are still living free from recurrence for shorter periods. At present about 35% of the patients die from the effects of the operation, but this figure can be greatly reduced, Prof. Graham

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said, if patients are subjected to operation before serious complications have occurred.

Science News Letter, October 4, 1941

Defense Against TB

THE MOST reliable and desirable of the body's defenses against tuberculosis is calcification, or turning the infected region into bone, Dr. Robert G. Bloch, associate professor of medicine at the University of Chicago, said.

Although it has been believed that calcification is merely a secondary process following complete healing of the disease, the development of bony matter from the infected area actually should be investigated as one of the most promising methods of cure, he said.

Studies by X-ray of more than forty thousand persons to determine the number infected with the tubercle bacillus have indicated that among the healing processes for the disease, calcification of the tuberculous spots is the most reliable and desirable, Dr. Bloch asserted.

"Such a metamorphosis into stonelike remnants of the original disease not only makes it impossible for the tubercle bacillus to live and grow, but also indicates the acquisition of a good immunity by the afflicted individual," he said. "Even though the petrification may not be complete, an abundant deposition of calcium salts surrounded by adequate scar tissue offers a fair protection against the reactivation and further spread of the disease.

"The necrotic (diseased and dying) process, the forerunner of calcification in the adult, is the all-important epidemiologic problem in tuberculosis. Small as it may be, as a potential excavation which will discharge its infectious content, it remains the ever-dangerous redistributor of the infection to the same individual and to others.

"The possible fostering of the process of calcification, therefore, seems a worthy goal of investigation."

Science News Letter, October 4, 1941

Two-thirds of Columbia University's freshmen this autumn are planning careers in engineering, science, and medicine.

An American engineer constructing an electric plant in the Belgian Congo had to improvise substitutes for missing dowel pins—the steel pins turned up later as nose ornaments of African tribesmen.

Made to order for school instruction

A FEW MONTHS AGO a limited membership group of friends of science was organized.

It was sponsored by Science Service, the non-profit institution for the dissemination of scientific knowledge. Because its members each month were to receive a unit of unusual objects of science, the group was named "THINGS of science."

More than 1,500 membership applications were received the first several weeks! The roster now approaches 5,000 members.

Teachers especially like to get the science units. For them a special feature is added: Each unit of THINGS contains one or more museum-style legend cards describing the component parts of the month's exhibit. Thus the material can be kept on display in laboratory cases when the teacher's personal or classroom use of the material has been served.

Here are some of the THINGS units members have received—one on Synthetic Rubber, another on Fingerprinting, another on Bimetal (see illustration), another on hundred-million-year-old Fossils, and so on. For example:

in the FABRICS unit:

It contains a piece of cloth made from salt, coal, lime, and air. And a piece of textile woven from fibers of spun glass. Also a small piece of synthetic fur made from swamp cat-tails. Also a small piece of synthetic wool made from milk produced in Italy and Germany for use in clothing. Lastly, the unit contains a piece of paper that looks and feels like cloth!

in the BIMETALLIC unit:

There are two pieces of metal in this exhibit, one a disc and one a strip. They look like one metal but are actually composed of layers of two! (See illustration.) Instructions for three surprising experiments come with them. In the home bimetal is now in use in from ten to fifty pieces of equipment! In your car bimetal is used for as many as thirteen functions.

in the METEORITE unit:

It contains two actual meteorite specimens, with full certification by authorities that they are actual fragments from the heavens such as can usually be viewed only in museums. Included is some of the sand pulverized by the tremendous impact of one of the largest meteorites ever to hit the earth.

in the MILLION YEAR FOSSIL unit:

This exhibit is in three parts. First, a section of fifty-million-year-old Dinosaur Bone from the Mesozoic Period. Second, there is a piece of Cretaceous Wood more than 100 million years old. Third, there is a Brachiopod Shell more than 300 million years old, in which life has not existed since the upper Devonian Period!

in the FINGERPRINT unit:

Here is an inkless fingerprinting outfit with material good for many impressions. Included are two purse fingerprint cards that may some time be useful to the owner in cashing a check. There are also two official fingerprint record documents. Instruction is given on the way to classify the arches, loops, whorls and composites in your own or any fingerprint.

in the SYNTHETIC RUBBER unit:

You pick up a piece of rayon web treated with the magic plasticized poly-vinyl chloride which

Experiment: Flame makes bimetal bend one way. Ice makes it bend the other!

makes it waterproof. Next, a piece of synthetic rubber made from oil, soap, natural gas and air—we may all be using this type of rubber before long! Then, for purposes of comparison and made in the same form as the synthetic piece, there is a section of natural rubber. There are instructions for experiments with each of these products.

IN ADDITION, every exhibit unit contains a brief, clear explanation of its contents, phrased so simply that it is no trouble at all to use the information when talking to the class. Definite experiments are suggested.

THINGS of science units are especially desirable for teachers. They add to your own store of information some tangible things which can be looked at, tried out, felt, and kept as a permanent exhibit. The legend cards help in the latter.

Dr. B. E. Holaday, State Normal School, Fredonia, New York, writes, "Congratulations upon the development of the technique for disseminating actual THINGS to interested people. My units will be given a prominent display space in the corridor."

The Science Counselor, quarterly journal of the Duquesne University Press, calls THINGS of science, "An exciting new help for science teachers," and adds, "You cannot afford to miss it."

Sister Casimir Czurlies, of Owensboro, Ky., adds, "I just wanted to tell you that THINGS is a dream realized, a dream I am sure many other science teachers have dreamed. It is the most useful subscription that has ever come to my notice and I gladly renew my trial membership."

Would you like to own three of the above interesting units of unusual material—just as received by the members? We will choose three from those now available and send them to you for \$1. Please mail remittance with order.

If the units delight you as much as we think they will, you are cordially invited then to join the group. But you are NOT obligated to join when you send in the coupon below.

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GEOLOGY

BIOGRAPHY OF THE EARTH, Its Past, Present, and Future—George Gamow—*Viking*, 242 p., illus., \$3. A popular work on historical geology, beginning with the various theories proposed to account for the origin of the planetary system, and going forward to conjectures on the future state of this particular planet. Illustrations are mainly in the form of diagrams which make the ideas set forth in the text more easily understood.

Science News Letter, October 4, 1941

ENTOMOLOGY

BUTTERFLIES—Ralph W. Macy and Harold H. Shepard—*Univ. of Minn. Press*, 247 p., illus., \$3.50. A book useful alike to the student and the serious amateur: the treatment is sufficiently scientific to satisfy the one and sufficiently popularized to please the other. There are four colored plates and a considerable number of half-tones, which though small are adequate for their purpose.

Science News Letter, October 4, 1941

GEOLOGY

THE ICE AGE PROBLEM—Walter Knoche—*Smithsonian Institution*, 5 p., 5c. (Miscellaneous Collections, Vol. 99, No. 22.) The author re-examines the paradoxical thesis that increasing warmth in a region might bring on an ice age, with examples from southern South America.

Science News Letter, October 4, 1941

ANATOMY

UPPER AND LOWER EXTREMITY MUSCLE AND INNERVATION CHARTS—Catherine Worthingham—*Stanford Univ. Press*, 35c. For kinesiology classes and for physical therapy technicians.

Science News Letter, October 4, 1941

POLITICAL SCIENCE—SOCIOLOGY

PROBLEMS OF AMERICAN DEMOCRACY, Audio-Visual and Teaching Aids—Margaret G. Cook, ed.—*Visual Aids Service, New Jersey State Teachers College*, 27 p., 50c.

Science News Letter, October 4, 1941

CHEMISTRY

INTRODUCTORY CHEMISTRY WITH HOUSEHOLD APPLICATIONS (rev. ed.)—Nellie M. Naylor and Amy Le Vesconte—*Appleton-Century*, 476 p., illus., \$3.25. The revised edition holds to the original thesis that chemistry is concerned with materials that are of daily importance to all of us. The text is especially adapted

to students of home economics, the illustrations being largely those that are familiar to a girl from her experiences at home.

Science News Letter, October 4, 1941

BOTANY

PLANTS COLLECTED BY R. C. CHING IN SOUTHERN MONGOLIA AND KANSU PROVINCE, CHINA—Egbert H. Walker—*Govt. Print. Off.*, 112 p., 30c. (Contributions from the United States National Herbarium, Vol. 28, Part 4). See *SNL* Aug. 16.

Science News Letter, October 4, 1941

ENGINEERING

ENGINEERING ENCYCLOPEDIA—Franklin D. Jones—*Industrial Press*, 1431 p., illus., 2 v., \$8. An encyclopedia and mechanical dictionary of the terms, methods, materials, and machinery used in engineering practice.

Science News Letter, October 4, 1941

MEDICINE

ESSENTIALS OF PHARMACOLOGY AND MATERIA MEDICA FOR NURSES—Albert J. Gilbert and Selma Moody—*Mosby*, 251 p., illus., \$3. A new text for nurses, designed for use in short courses for which more comprehensive texts may prove suitable only for reference.

Science News Letter, October 4, 1941

ANTHROPOLOGY

WESTERN AND SOUTHWESTERN INDIAN SKULLS—E. B. Renaud—*Univ. of Denver*, 94 p., 85c. Detailed data, including measurements, descriptions, and comments on a number of Indian skulls, particularly those of Plains, Basket Maker, and Pueblo origin.

Science News Letter, October 4, 1941

MEDICINE

MICROBES WHICH HELP OR DESTROY US—Paul W. Allen, D. Frank Holtman and Louise Allen McBee—*Mosby*, 540 p., illus., \$3.50. This book might best be described as a textbook on bacteriology for the laymen.

Science News Letter, October 4, 1941

GEOPHYSICS

TRANSACTIONS OF 1941, American Geophysical Union. Part I, Joint Regional Meeting, South Pacific Coast Area, Sacramento, California, January, 1941; Reports and Papers (A) Section of Hydrology (B) Western Interstate Snow-survey Conference—*National Research Council*, 217 p., \$1.50.

Science News Letter, October 4, 1941

MEDICINE—BOTANY

MILK SICKNESS CAUSED BY WHITE SNAKEROOT—Edwin Lincoln Moseley—*Ohio Academy of Science and Author*, 171 p., \$1. Dr. Moseley here sums up results of many years of careful gathering of evidence that milk-sickness is caused by one poisonous plant species, *Eupatorium urticaefolium*, widely, though fortunately not abundantly, distributed over the eastern United States and southeastern Canada. It makes cattle sick, and is transmitted to human beings through dairy products and meat.

Science News Letter, October 4, 1941

HYGIENE—EDUCATION

FUNCTIONAL HEALTH TEACHING SYLLABUS; An Experiment directed by the North Central Association in Nine Co-operating Schools—Lynda M. Weber, Organizer and Director—*Ginn*, 165 p., \$1.75.

Science News Letter, October 4, 1941

MEDICINE

HANDBOOK OF COMMUNICABLE DISEASES—Franklin H. Top and Collaborators—*Mosby*, 682 p., 73 illus., 10 color plates \$7.50. A practical "handy reference" for physicians, nurses and others whose professional duties bring them in contact with communicable diseases.

Science News Letter, October 4, 1941

STATISTICS

THE SECOND YEARBOOK OF RESEARCH AND STATISTICAL METHODOLOGY, Books and Reviews—Oscar Krisen Buros, ed.—*Gryphon Press*, 383 p., \$5. Compilations of critical reviews from the principal journals of the English-speaking world evaluating 359 books published in the last two years in the broad field of statistics and scientific methods. To browse through it is like sampling inviting books on a library shelf.

Science News Letter, October 4, 1941

AGRICULTURE

COMMERCIAL FERTILIZERS, Their Sources and Use (3d ed.)—Gilbert H. Collings—*Blakiston*, 480 p., illus., \$4.50.

Science News Letter, October 4, 1941

ORNITHOLOGY

WE FOLLOW THE WESTERN TRAIL—Ruth Wheeler—*Macmillan*, 160 p., illus., \$2. Quiet adventures in the Western out-of-doors, always with an eye (and a ready camera lens) out for interesting birds.

Science News Letter, October 4, 1941